FDCMIM-04/08/24/28/34/38/44/48
FDDI CONCENTRATORS

INSTALLATION GUIDE

CABLETRON SYSTEMS, P.O. Box 5005, Rochester, NH 03867-0505

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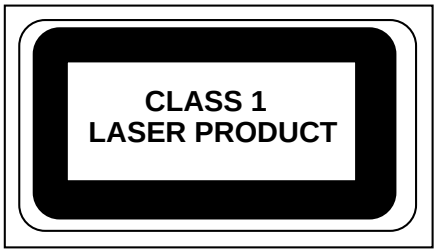
SAFETY INFORMATION
CLASS 1 LASER TRANSCEIVERS



Class 1 Laser Products

The FDCMIM-34 and FDCMIM-38 connectors use Class 1 Laser transceivers. Read the following safety information before installing or operating the FDCMIM-34 or FDCMIM-38.

The Class 1 laser transceivers use an optical feedback loop to maintain Class 1 operation limits. This control loop eliminates the need for maintenance checks or adjustments. The output is factory set, and does not allow any user adjustment. Class 1 Laser transceivers comply with the following safety standards:

- 21 CFR 1040.10 and 1040.11 U.S. Department of Health and Human Services (FDA).
- IEC Publication 825 (International Electrotechnical Commission).
- CENELEC EN 60825 (European Committee for Electrotechnical Standardization).

When operating within their performance limitations, laser transceiver output meets the Class 1 accessible emission limit of all three standards. Class 1 levels of laser radiation are not considered hazardous.

SAFETY INFORMATION
CLASS 1 LASER TRANSCEIVERS

Laser Radiation and Connectors

When the connector is in place, all laser radiation remains within the fiber. The maximum amount of radiant power exiting the fiber (under normal conditions) is -12.6dBm or $55x10^{-6}$ watts.

Removing the optical connector from the transceiver allows laser radiation to emit directly from the optical port. The maximum radiance from the optical port (under worst case conditions) is 0.8 W cm^{-2} or $8x10^{3}$ W m^{-2} sr^{-1}.

WARNING: Do not use optical instruments to view the laser output. The use of optical instruments to view laser output increases eye hazard. When viewing the output optical port, you must remove power from the network adapter.

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CHAPTER 1

INTRODUCTION

The FDCMIM-04/08/24/28/34/38/44/48 are components of a modular dual attached concentrator. These components attach to an FDDI dual ring through the Cabletron Systems FDMMIM, FDMMIM-04, FDMMIM-24, or FDMMIM-30.

Note: *Throughout this manual, unless otherwise noted, the term FDCMIM refers to the FDCMIM-04/08/24/28/34/38/44/48.*

FDCMIMs reside in a Multi Media Access Center (MMAC), and you can use them either with or without an FDMMIM, since you can form a stand-alone FDDI network using one or more FDCMIMs.

The FDCMIM-X4s have four and the FDCMIM-X8s have eight master ports (where X varies, depending on the cable/transmitter type) that accept different connectors. Chapter 4, **Specifications**, lists the operating specifications for the different available FDCMIM cable and transmitter types.

1.1 USING THIS MANUAL

This manual explains how to install FDCMIM concentrator modules. The following summarizes the chapter organization.

Chapter 1, **Introduction**, describes the FDCMIM and its features.

Chapter 2, **Configuration and Installation**, includes installation requirements, and detailed instructions for installing your FDCMIM into an MMAC hub as a stand-alone concentrator.

Chapter 3, **Using LANVIEW®**, describes the purpose of each FDCMIM LANVIEW LED.

Chapter 4, **Specifications**, provides operating specifications for each FDCMIM cable/transmitter type.

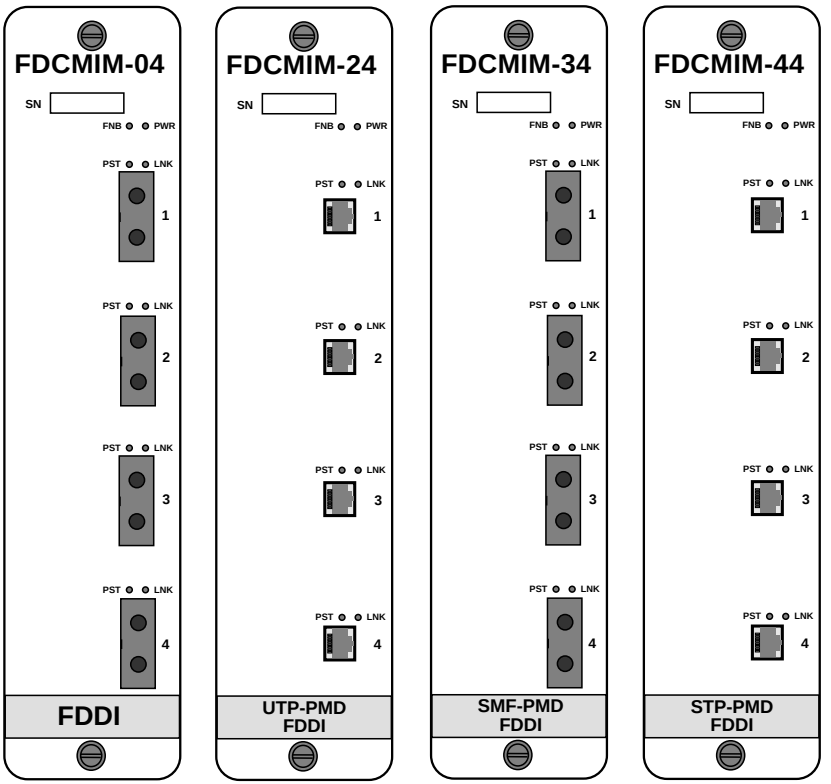

Figure 1-1. FDCMIM-04 / 24 / 34 / 44 FDDI Concentrator Media Interface Modules

1.2 OVERVIEW

The FDCMIM is a concentrator module that resides in an MMAC network hub containing a Flexible Network Bus (FNB). The FDCMIM acts as a modular component in a Dual Attached Concentrator.

FDCMIMs (and their attached stations) gain access to an FDDI dual ring network through an FDMMIM, FDMMIM-04, FDMMIM-24, or FDMMIM-30 the Cabletron Systems X3T9.5 compliant Dual Attached Concentrator and Ethernet to FDDI Bridge Media Interface Modules. The FDCMIM connects to the FDMMIM through the FDDI portion of the MMAC Flexible Network Bus.

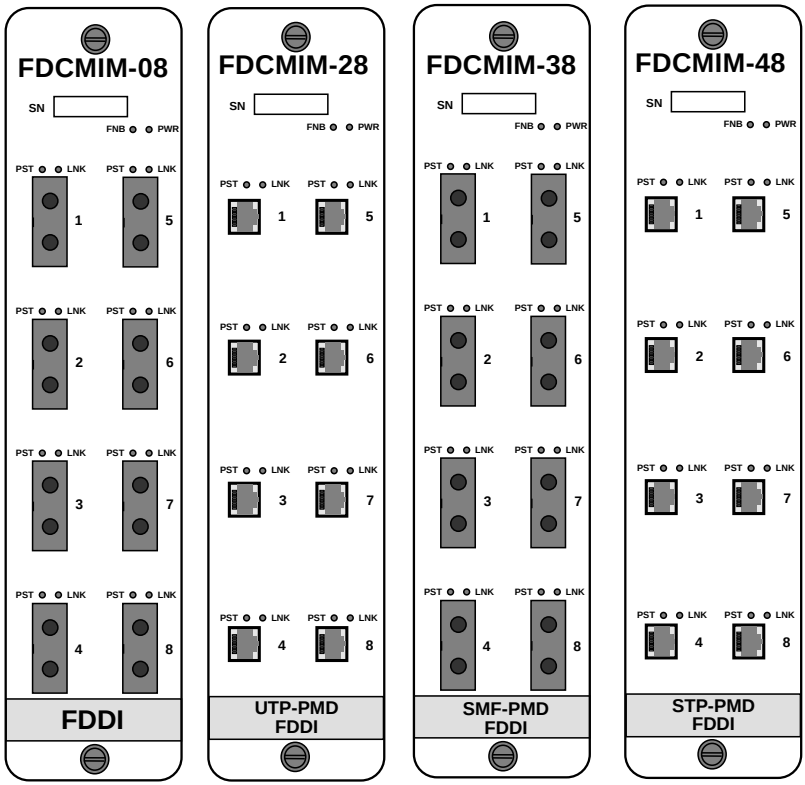

Figure 1-2. FDCMIM-08 / 28 / 38 / 48 FDDI Concentrator Media Interface Modules

By using an FDMMIM, FDMMIM-04, FDMMIM-24, or FDMMIM-30 you can manage adjacent FDCMIMs through FDMMIM Local Management, the out-of-band management facility resident on the FDMMIM and FDMMIM-04 modules. You can also manage FDCMIMs with Cabletron Systems SNMP management tools such as SPECTRUM® or Remote LANVIEW/Windows®.

FDCMIMs also provide the flexibility of forming a single ring stand-alone FDDI concentrator. Since FDCMIMs connect through the MMAC backplane through an isolated FDDI bus, you can link several modules, and their subsequent stations, together without the need for a bridge or repeater.

1.3 GETTING HELP

If you need additional support relating to the FDCMIM, or if you have any questions, comments, or suggestions relating to this manual, contact Cabletron Systems Technical Support. Before calling, please have the following information ready:

- The product type (e.g., FDCMIM-24 or FDCMIM-38)
- The product serial number.

Note: *Locate the serial number on the FDCMIM front panel.*

You can contact Cabletron Systems Technical Support by any of the following methods:

By phone:	Monday through Friday between 8 A.M. and 8 P.M. EST at (603) 332-9400.
By CompuServe®:	GO CTRON from any ! prompt
By Internet mail:	support@ctron.com

CHAPTER 2

CONFIGURATION AND INSTALLATION

This chapter lists MMAC configuration guidelines, explains how to configure the FDCMIM in a hub that also holds Ethernet or Token Ring MIMs, and then explains how to install the FDCMIM as a stand-alone concentrator in an FDDI hub.

2.1 INSTALLATION REQUIREMENTS

Before you start the installation, decide how you want to configure the MMAC. The location of an FDCMIM in an MMAC determines how it communicates with other FDDI modules in the same hub.

2.2 ADDING MIMS TO AN MMAC

When configuring an MMAC, remember the following:

- MMAC-3FNB board slot numbers increment from bottom to top. MMAC-5FNB, MMAC-8FNB, and MMAC-M8FNB slot numbers increment from right to left.

- Slot 1 (the farthest slot to the right, or to the bottom) in every MMAC is a narrow slot reserved for half-width management modules (like the TRMM, IRM3, or EMME). Do not place full-width modules in the first slot of an MMAC. When not using a half-width management module, leave slot 1 empty.

- An MMAC-5FNB can hold four MIMs, one management module, and two power supplies. By removing one power supply, the MMAC-5FNB can hold an extra MIM, assuming that the remaining power supply has enough capacity to handle the combined load of the resident MIMs.

- The FDDI Media Interface Modules (MIMs) consume more power than other MIMs. Some older MMACs may not have enough power available to support a planned configuration.

To better explain how to configure your MMAC, refer to the following examples. Figure 2-1 illustrates how the combined load of two FDCMIMs exceeds the available power of an MMAC-3FNB.

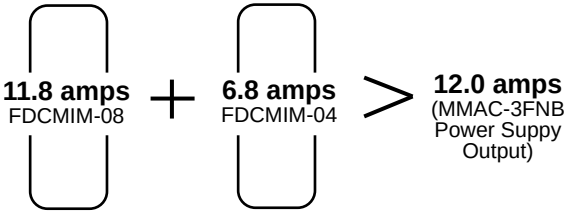

Figure 2-1. FDCMIMs in an MMAC-3FNB

Figure 2-2 represents an MMAC-5FNB equipped with dual power supplies and three FDCMIMs. The MMAC has enough power to support the configuration. However, the combined load of the modules exceeds the output of a single power supply. This means that the hub does not have redundant power (the ability of one power supply to assume the entire load if one supply fails).

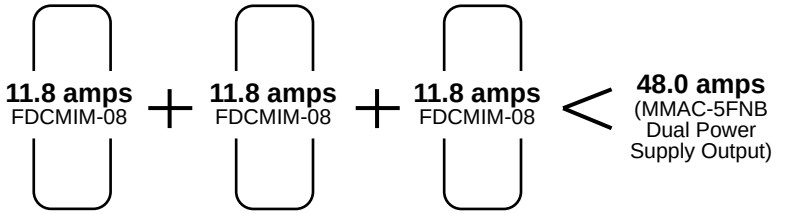

Figure 2-2. FDCMIMs in an MMAC-5FNB

Figure 2-3 represents an MMAC-M8FNB equipped with a full complement of power supplies and three FDCMIMs. The MMAC power supplies can produce up to 80 amps of power, providing more than double the power necessary for operation. This configuration provides redundant power to the hub.

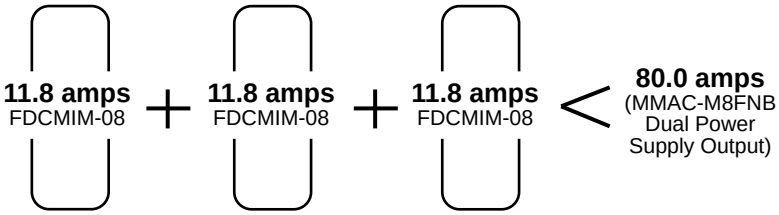

Figure 2-3. FDCMIMs in an MMAC-M8FNB

When unsure of a hub's ability to support a planned MIM configuration, check the appropriate manuals to determine the amount of power consumed by each MIM (amps at 5 Vdc), and then check your MMAC power supply configuration (single or multiple power supplies) to determine if you have sufficient power available to support the configuration.

2.3 MMAC CONFIGURATIONS

A single FDCMIM or multiple FDCMIMs in the same MMAC hub comprise a stand-alone FDDI single ring concentrator. This section describes four FDCMIM stand-alone configurations:

- FDCMIMs exclusively (using shunting and non-shunting MMAC hubs)
- IRM3 Ethernet management module, Ethernet MIMs, and FDCMIMs
- EMME Ethernet management module, at least one Ethernet RMIM, and FDCMIMs
- TRMM Token Ring management module, Token Ring MIMs, and FDCMIMs

The examples in this section use the FDCMIM as a stand-alone concentrator. If you are using an FDMMIM to connect the FDCMIM stations to the FDDI ring, the descriptions in this section still apply.

2.3.1 FDCMIMs Exclusively

By mixing FDCMIMs, you can create a stand-alone FDDI network of 4 to 56 nodes (7 FDCMIM-X8s in an MMAC-M8FNB = 56 master ports). Depending on MMAC shunting capabilities, you may have to install your FDCMIMs in adjacent slots to ensure continuity.

Two types of MMACs currently support FNB architecture — shunting and non-shunting. Shunting MMAC-FNBs allow modules to continue communicating on their perspective buses, regardless of whether there is an empty slot between them in the chassis.

For example, let's say you have FDCMIMs in slots 2, 3, 4, 6, and 7 of an MMAC-M8FNB (slot 5 is empty). In a non-shunting MMAC, you have two stand-alone networks (i.e., FDCMIMs in slots 2, 3, and 4 would constitute one network, and FDCMIMs in slots 6 and 7 would constitute the other). Slot 5, the empty slot, breaks the continuity of the non-shunting MMAC FDDI bus, separates it into two distinct buses, and two separate networks.

However, with the same configuration in a shunting MMAC-M8FNB, you would have one stand-alone network consisting of five FDCMIMs. You don't need to worry about empty MMAC slots, since the MMAC FDDI bus, and FDCMIM communication remains intact.

The following table gives the part numbers of the MMAC chassis that have shunting capabilities.

Table 2-1. MMACs with Shunting Capabilities

MMAC Chassis	Part #
MMAC-3FNB	FC000000000 or above
MMAC- 5FNB	CC000000000 or above
MMAC-8FNB	CG000000000 or above
MMAC-M8FNB	DK000000000 or above
MMAC-M5FNB	all
MMAC-M3FNB	all

2.3.2 IRM3 and Ethernet MIMs with FDCMIMs

This example uses the IRM3, but the same guidelines apply if you are using an IRM, IRM2, or IRBM.

In Figure 2-4, the MMAC-5FNB has an IRM3 in slot 1, TPMIM-22s in slots 2 and 3, and FDCMIMs in slots 4 and 5. The FDCMIMs form a stand-alone FDDI network with no connection to the Ethernet components. Since there is no connection between the FDDI (C) bus and the Ethernet (A) bus in the MMAC, the two disparate networks have no affect on each other.

2.3.3 EMME and RMIMs with FDCMIMs

The EMME, a narrow (i.e., slot 1) Ethernet management module, works with the repeater interface controller family of MIMs (RMIM): TPRMIM, CXRMIM, and FORMIM. The RMIMs can take full advantage of the MMAC's Flexible Network Bus (FNB), making them unique. You can configure RMIMs to use either the B or C bus of the FNB. This means that an RMIM can put Ethernet traffic on the MMAC buses that normally see Token Ring and FDDI traffic.

The EMME can manage Ethernet traffic on the A bus (the dedicated Ethernet bus), either FNB data bus (B or C), the D bus (through the front panel), and can bridge traffic among the A, B, C, and D networks. (See Figure 2-5.)

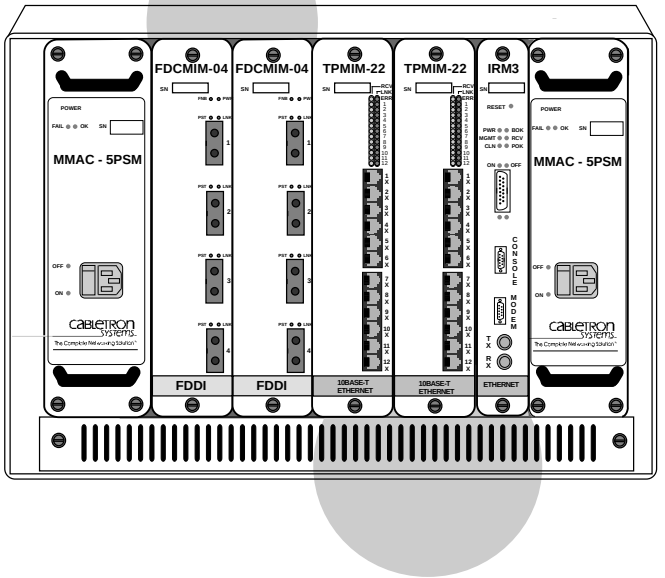

Figure 2-4. MMAC-5FNB with FDDI and Ethernet MIMs

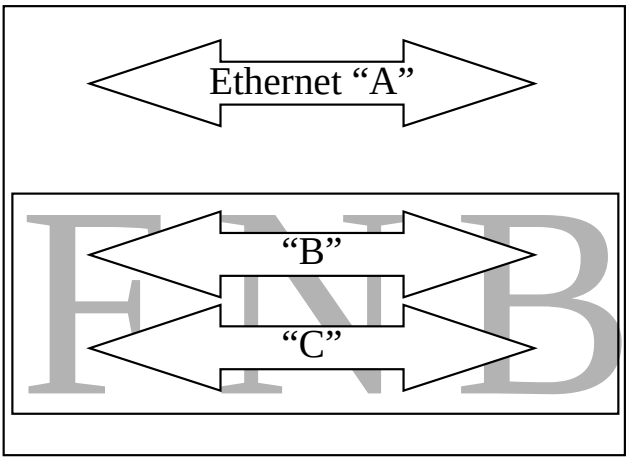

Figure 2-5. MMAC Data Bus Structure

Even though RMIMs can place Ethernet traffic on the bus that normally handles FDDI traffic, FDDI MIMs can still reside in the same hub with RMIMs. RMIMs determine whether or not the MIM that resides in the next higher numbered MMAC slot is an Ethernet MIM. If the next MIM is not an Ethernet MIM, the RMIM activates relays that, in effect, terminate the B and C buses. To eliminate potential problems, we recommend installing the RMIMs in lower numbered slots and the FDDI MIMs in higher numbered slots.

For example, assume that we have an MMAC-5FNB with the following configuration:

Slot 1 - EMME
Slot 2 - TPRMIM-36
Slot 3 - FDCMIM-04
Slot 4 - FDCMIM-08

After turning on the MMAC, the TPRMIM checks the MIM in slot 3. When it determines that slot 3 does not hold an Ethernet MIM, it activates the relays that terminate the Ethernet section of the B and C buses. This isolates the FDCMIMs from the rest of the MIMs in the hub. This example uses the TPRMIM, but the same is true if you use any of the other RMIMs as well.

For a more thorough description of the RMIMs and how they use the MMAC buses, see your RMIM documentation.

2.3.4 TRMM and Token Ring MIMs with FDCMIMs

Token Ring and FDDI traffic on an MMAC bus follow distinct pathways. As long as your Token Ring MIMs reside in **adjacent** lower numbered slots, and the FDDI MIMs reside in **adjacent** higher numbered slots, the two networks can peacefully share an MMAC.

For example, if you have an MMAC-5FNB with a TRMM (Token Ring Management Module) in slot 1, and TRMIM-12s in slots 2 and 3, you can put an FDCMIM in slot 4. The FDCMIM inter-connects any workstations that attach to its master ports and functions as a stand-alone network. The FDCMIM coexists, but does not communicate, with the adjacent Token Ring network.

2.4 TWISTED PAIR PINOUT CONFIGURATION

This section provides the RJ-45 pinout configuration for Unshielded Twisted Pair (UTP) and Shielded Twisted Pair (STP) Physical Layer Medium Dependent (PMD) ports.

Note: *When connecting two twisted pair ports together (e.g., an M type port on an FDCMIM-24 to an F7069 Desktop Network Interface (DNI) card), a transmit and receive cross-over must occur between the two devices (i.e., within the cable).*

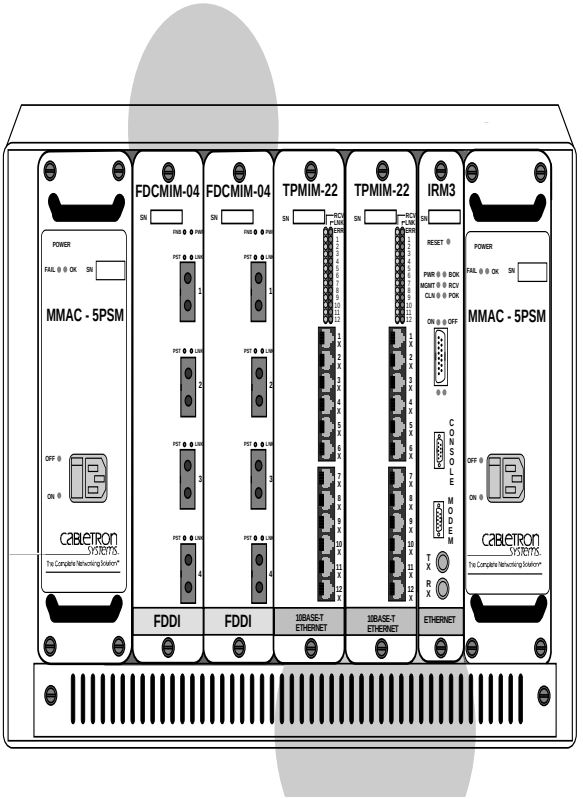

Figure 2-6. RJ-45 TP-PMD Port Pinouts

2.5 INSTALLING THE FDCMIM

The FDCMIM has "hot swap" capabilities. This means you can insert and remove the module without first turning off the MMAC. Occasionally, depending on the MMAC configuration, other MIMs in the hub may go into a reset condition when you hot swap an FDCMIM. A reset condition can cause a momentary, but self correcting, interruption in network service.

Hot swapping does not damage any Cabletron Systems module. However, we recommend turning off the MMAC when inserting or removing any MIM. If you cannot turn off the MMAC, hot swapping modules is acceptable.

Note: *Observe all static precautions when handling FDCMIM boards.*

After choosing an appropriate MMAC slot, use the following instructions to install the FDCMIM:

1. Turn off the power to the MMAC. Remember that MMACs with multiple power supplies have an On/Off switch for each supply.

2. Remove the FDCMIM from its protective cover. Always leave the FDCMIM inside the protective cover when it is not installed in an MMAC. If you need to set the MIM down for a moment during installation, set it on a clean, non-conductive surface.

3. Holding the FDCMIM by the front panel, or by the edges of the circuit board, align the bottom and top edges of the card with the slot guides in the MMAC chassis. Be sure both the bottom and top edges of the card rest in the guide slots. (See Figure 2-6.)

4. Slide the FDCMIM into the MMAC until you feel it meet the backplane. At his point, the front panel should be about 1/2 inch from being flush with the rest of the modules in the MMAC.

5. Press gently to seat the module into the backplane. Do not try to force the module into place or attempt to use the knurled nuts to draw the module into the backplane. Forcing a misaligned module into place can damage the FDCMIM or the MMAC backplane.

6. Once the module seats in the backplane, tighten the two knurled knobs. This step is important. If you do not tighten the knurled knobs, vibration can cause the module to lose contact with the backplane and disrupt your network.

7. Return power to the MMAC.

Your FDCMIM installation is now complete, and you can make connections to your network.

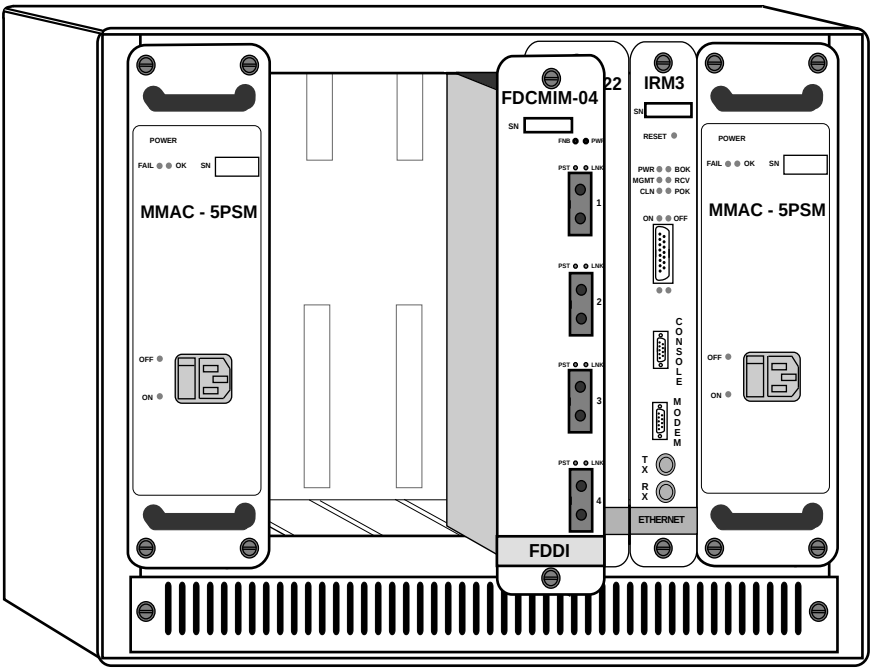

Figure 2-7. Installing the FDCMIM into an MMAC

CHAPTER 3

USING LANVIEW

LANVIEW is a visual diagnostic and status monitoring system developed by Cabletron Systems. LANVIEW LEDs can help you troubleshoot network problems such as open segments or FDCMIM power problems. The following sections describe FDCMIM LEDs.

3.1 FDCMIM STATUS LEDS

The FDCMIM has two LEDs, PWR and FNB, that show MIM status.

PWR (Power)

When ON, this green LED indicates that the FDCMIM is getting power from the MMAC.

If the MMAC power is ON, but the FDCMIM PWR LED is OFF, remove the FDCMIM from the MMAC and check for bent or broken pins on the FNB (backplane) connectors. If you find any damaged connectors, do not re-install the FDCMIM. Contact Cabletron Systems Technical Support.

FNB (Flexible Network Bus Status)

This multi-state LED can indicate the following:

Green	The FDCMIM connects to one or more FDDI MIMs through the MMAC FDDI bus.
Amber	Management has disabled this module.

Note: *You must use an FDMMIM in conjunction with the FDCMIM to have management available. If you do not have an FDMMIM in the hub, an amber LED indicates an FDCMIM hardware problem.*

FNB (continued)

Red or Flashing Red	The FDCMIM has failed.
LED off	The FDCMIM does not connect to any other MIM through the MMAC bus. The single FDCMIM comprises a stand-alone network.

3.2 PORT STATUS LEDs

Each FDCMIM port has two LEDs — PST and LNK. These LEDs show the port status.

PST (Port Status)

This multi-state LED can indicate the following:

Green	The station attached to the port is connected to the network.
Amber	Management has disabled this port.

Note: *You must use an FDMMIM in conjunction with the FDCMIM to have management available. If you do not have an FDMMIM in the hub, and the PST LED is amber, the attached station has initiated a trace. With no management available, the FDCMIM disables the port. To re-enable the port, remove the cable from the port and cycle the power to the FDCMIM.*

Red or Flashing Red	The port has failed. On an FDCMIM-X4 (i.e., any FDCMIM having 4 ports), when one port fails due to a hardware malfunction, most likely all ports are inoperative. FDCMIM-X8 ports 1 through 4 are independent of ports 5 through 8. In other words, one group of ports can fail without affecting the other group.
LED off	The port has no valid connector attached.

LNK (Media Link OK)

When ON, this green LED indicates that a connection exists between the FDCMIM and the node at the other end of the port cable segment. To ensure you maintain the link, the port generates an idle signal when not transmitting data.

When OFF, this LED indicates that either nothing is connected to the FDCMIM port or the port is not receiving any signal.

CHAPTER 4

SPECIFICATIONS

This chapter lists the operating specifications for the FDCMIM series modules. Cabletron Systems reserves the right to change these specifications at any time, without notice.

Fiber Optic Interface

Depending on the FDCMIM, interfaces have the following characteristics:

Multimode Transmitter

Optical wavelength:	1330 nm typical
Optical output:	-20.0 dBm minimum -14.0 dBm maximum
Optical rise time:	3.5 nsec maximum
Optical fall time:	3.5 nsec maximum
Spectral width:	110 nm maximum
Supply current:	150 mAmps maximum

Multimode Receiver

Optical wavelength:	1330 nm typical
Optical input:	-31.0 dBm minimum -14.0 dBm maximum
Optical rise time:	5 nsec maximum
Optical fall time:	5 nsec maximum
Supply current:	115 mAmps maximum

Multimode Receiver (Signal Detect)

Assert power:	-33.0 dBm typical -31.0 dBm maximum
Assert time:	10 µsec typical 100 µsec maximum
Deassert power:	-36.0 dBm typical -45.0 dBm minimum
Deassert time:	10 µsec typical 350 µsec maximum
Hysteresis:	1.5 dB

Unshielded Twisted Pair Transmitter

Amplitude:	1.080 Vpk maximum 0.920 Vpk minimum
Rise time:	2 nsec minimum 4 nsec maximum
Fall time:	2 nsec minimum 4 nsec maximum
Rise/Fall variation:	0.5 nsec maximum
Overshoot:	5% maximum
Droop (14 symbols):	3% maximum

Unshielded Twisted Pair Receiver (Signal Detect)

Assert Time:	10 µsec typical 100 µsec maximum
Deassert time:	10 µsec typical 350 µsec maximum

Shielded Twisted Pair Transmitter

Amplitude:	1.325 Vpk maximum 1.125 Vpk minimum
Rise time:	2 nsec minimum 4 nsec maximum
Fall time:	2 nsec minimum 4 nsec maximum
Rise/Fall variation:	0.5 nsec maximum
Overshoot:	5% maximum
Droop (14 symbols):	3% maximum

Shielded Twisted Pair Receiver (Signal Detect)

Assert Time:	10 µsec typical 100 µsec maximum
Deassert time:	10 µsec typical 350 µsec maximum

Single Mode Transmitter

Optical wavelength:	1300 nm typical
Optical output:	-20.0 dBm minimum -14.0 dBm maximum
Optical rise time:	3.5 nsec maximum
Optical fall time:	3.5 nsec maximum
Spectral width:	140 nm maximum
Supply current:	150 mAmps maximum

Single Mode Receiver

Optical wavelength:	1330 nm typical
Optical input:	-31.0 dBm minimum -14.0 dBm maximum
Optical rise time:	5 nsec maximum
Optical fall time:	5 nsec maximum
Supply current:	115 mAmps maximum

Single Mode Receiver (Signal Detect)

Assert power:	-33.0 dBm typical -31.0 dBm maximum
Assert time:	10 µsec typical 100 µsec maximum
Deassert power:	-36.0 dBm typical -45.0 dBm minimum
Deassert time:	10 µsec typical 350 µsec maximum
Hysteresis:	1.5 dB

Cable Types

The FDDI Physical Layer Medium Dependent (PMD), Twisted Pair Physical Layer Medium Dependent (TP-PMD), and Single Mode Fiber Physical Medium Dependent (SMF-PMD) ANSI standards define cable requirements as follows:

Multimode Fiber:

Core diameter:	62.5 µm nominal
Cladding diameter:	128.0 µm maximum 122.0 µm minimum
Cable attenuation:	≤ 2.5 dB/km typical

Unshielded / Shielded Twisted Pair:

Cable / Connector — Category 5

Single Mode Fiber:

Core diameter:	8.7 µm +/- 0.5 µm
Cladding diameter:	127.0 µm maximum
Cable attenuation:	≤ 0.5 dB/km typical

Multimode Fiber Optic Cable Length

The PMD FDDI standard specifies the following:

Maximum total cable length:	100 km (62 miles) — dual ring 200 km (124 miles) — wrapped
Maximum multimode cable length between adjacent nodes:	2 km (1.2 miles)

Twisted Pair Cable Length

The TP-PMD FDDI standard specifies the following:

Maximum total cable length:	100 km (62 miles) — dual ring 200 km (124 miles) — wrapped
Maximum twisted pair cable length between adjacent nodes:	100 m (328.1 feet)

Single Mode Fiber Optic Cable Length

The SMF-PMD FDDI standard specifies the following:

Maximum total cable length:	100 km (62 miles) — dual ring 200 km (124 miles) — wrapped
Single mode cable length between adjacent nodes:	40 km (24 miles) maximum 25 km (15 miles) typical

Power Requirements

The high bandwidth of FDDI means that FDDI MIMs consume more power than Ethernet or Token Ring MIMs. Power requirements vary from one FDCMIM-04 or FDCMIM-08 to another, depending on the motherboard you have.

To determine your FDCMIM-04 or FDCMIM-08 power requirements:

- Locate the serial number on the front panel of the FDCMIM.
- Match the beginning of the serial number on the FDCMIM with one of the following numbers.

Note: *Depending on your FDCMIM version, you may have to preface serial numbers with number 940. In other words, a serial number beginning with 0568 is the same as one starting with 9400568.*

Use the following power consumption numbers when determining if a particular MMAC has enough power to support your configuration.

FDCMIM-04 (SN 0568):	6.8 Amp at 5 Vdc
FDCMIM-04 (all others):	4.1 Amp at 5 Vdc
FDCMIM-08 (SN 0569):	11.8 Amp at 5 Vdc
FDCMIM-08 (all others):	7.0 Amps at 5 Vdc
FDCMIM-24:	5.0 Amp at 5 Vdc
FDCMIM-28:	9.0 Amp at 5 Vdc
FDCMIM-34:	3.9 Amps at 5 Vdc
FDCMIM-38:	6.6 Amps at 5 Vdc
FDCMIM-44:	5.0 Amps at 5 Vdc
FDCMIM-48:	9.0 Amps at 5 Vdc

Note: *When calculating the total heat output of an MMAC hub, we recommend that you consider the maximum potential heat output of the MMAC power supplies rather than the heat output of the individual MIMs within the hub. This approach ensures a more reliable heat output total to use in long range facilities planning.*

Environment

Storage temperature:	-40°C minimum 85°C maximum
Operating temperature:	5°C minimum 40°C maximum
Operating humidity:	5% to 95% non-condensing

Safety

This unit meets the safety requirements of UL 1950, CSA C22.2 No. 950, and EN 60950; the EMI requirements of FCC Class A and EN 55022 Class A; and the EMC requirements of EN 50082-1.

Note: *It is the responsibility of the person who sells the system to which the FDCMIM will be a part to ensure that the total system meets allowed limits of conducted and radiated emissions.*